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The interplay between attention, experience and skills in online language teaching

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Abstract: The demand for online teaching is growing as is the recognition that online teachers require highly sophisticated skills to manage classrooms and create an environment conducive to learning. However, there is little rigorous empirical research investigating teachers' thoughts and actions during online tutorials. Taking a sociocultural perspective, this study explores the interplay between the attention focus of language teachers during synchronous online tutorials and their reflections on their own teaching practices. Eyetracking data show that patterns of attention focus on different areas of the screen (representing technical facilities, social interaction and content) are related to practitioners' experience in online teaching including familiarity with a particular platform. In particular, those with less online teaching experience display greater attention to technical areas than their more experienced colleagues. These findings are confirmed in the teachers' reflective interviews, stimulated by watching gazeplot videos of their online tutorials. Their reflections also yield deeper insight into reasons for particular actions. Thematic analysis was used to relate the reflections on teaching strategies to the levels of online teaching skills (Hampel and Stickler 2005, New skills for new classrooms: Training tutors to teach languages online. *Computer Assisted Language Learning* 18(4). 311–326). Our research has extended Bax's normalisation (2003, CALL – past, present and future. *System* 31(1). 13–28. doi: 10.1016/s0346-251x(02)00071-4) of the use of technology in face-to-face classroom learning into online learning environments. Mirroring the ontogenetic development of increasing digitalisation, teachers in online environments appropriate the skills necessary to free cognitive resources for attending to social and pedagogic aspects of their teaching.

Keywords: eyetracking, online synchronous language teaching, online teaching skills, attention focus, reflection

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1 Introduction

Watching online language teachers at work, it soon becomes obvious to the observer that these professionals display a high level of very specific skills. These include adapting to a multimodal environment, facilitating communication, being attentive to mediation between different languages and cultures, and deftly handling supporting technology. Teachers of other subjects working within a sociocultural pedagogical framework can learn from their skills in encouraging interaction between their learners and scaffolding learning dialogues. The purpose of this paper is to present new knowledge about different forms/levels of synchronous online teaching identified through an innovative combination of eyetracking and stimulated reflection interviews. This takes into account external data showing teachers' attention focus, and introspective data reflecting on their skills and strategies. Our findings and conclusions will inform online teacher training beyond foreign language teaching.

Synchronous online tutorials demand a high level of explicitness from the teacher, as many of the non-verbal elements of communication are absent. Interaction in a second language is a very specialised form of communicating and thinking together that promotes learning in an exploratory and engaged manner leading to internalisation of language skills. Teaching in a language that is not native to the students adds a layer of complexity and necessitates even more frequent measures of scaffolding and clarification. Hence, it can be argued that online language teachers are among the most self-aware of teaching professionals, and ideally placed to provide a window into the thoughts and reflections of an educator.

As language teaching researchers we adopt a sociocultural stance (Lantolf and Thorne 2007; Vygotsky 1978; Wertsch 1994), placing our education studies between theory and practice. We see online language learning as a form of communication mediated by technology (Hampel 2009), language (Lantolf 2000), and pedagogy (Stickler and Shi 2017). It is distinctive in that the technology used for synchronous online interaction changes the form of communication. Secondly, the language used is simultaneously the subject of learning and the means for communication; and finally, the pedagogical stance is an educational dialogue, scaffolded by the teacher as competent user of the L2 and enacted by the learners. At the same time, we see that the collaborative research process between researchers and participants can jointly create insights that would not otherwise emerge. Our aim is co-creation of new knowledge through reflection and involvement.

In our research we have used a unique combination of methods to gain access to the attention focus of teachers on the one hand and their thoughts

about teaching strategies on the other. By combining eyetracking with stimulated reflection (SR) interviews, we can offer an outsider view of the shifting attention focus of online teachers through analysis of their gaze movements, and an insider view of thoughts and strategies, based on teachers' detailed reflections stimulated by interviewer questions while jointly viewing a replay of their gazeplot video. Whereas previous studies of online teaching skills (e. g. Levy et al. 2009) rely either on observation (outsider view) or on post-hoc reflection of the teacher (insider view), our unique, innovative approach combines the two perspectives, making our findings richer, and more robust and reliable. Furthermore, our approach fulfils the demand of Dede and his colleagues that research methodologies in studying online teaching “do not simply replicate methods used in studying face-to-face professional development but instead take advantage of the unique data collection possible in online programs” (Dede et al. 2009: 16).

This paper on teaching behaviours and strategies complements previous work by the authors in investigating the strategies of language learners participating in online language tutorials (Stickler and Shi 2015). It also builds on and refines previous work justifying eyetracking as a reliable and innovative method in language learning research (O'Rourke et al. 2015; Stickler and Shi 2017; Stickler et al. 2016).

Section 2 will explore the context of online language teaching and the teachers' experience, the method of eyetracking, the mixed method approach we have chosen for our study and the research questions. In Section 3 we will present our project and the data analysis. Results and findings (Section 4), discussion (Section 5) and conclusion (Section 6) form the final parts of our paper.

2 Context of our study

2.1 Online language teaching

This section sets our study in the context of previous research in online language teaching.

2.1.1 Normalization of online teaching

There has been an increase in distance and online language learning over the last two decades, with the Open University and its approximately 9,000

language learners at the forefront of this growth (Hampel and de los Arcos 2013: 1). Elements of distance learning have also been introduced into classroom-based language learning in blended learning (Murphy 2011: 17) and an increasing number of language schools are offering courses through “desktop video-conferencing platforms” (Guichon 2009: 167).

The original concept of “normalization” (Bax 2003: 16) refers to the use of technology in face-to-face classrooms when the technology becomes so commonplace that it is no longer noticeable. This concept is a useful lens through which to observe changes in teaching and learning over time and has not yet been fully developed for online teaching. Synchronous online language teaching is now at a stage where it might become “normalized”, and so the concept should be extended to encompass it.

It is increasingly accepted that “[t]echnology-mediated language learning is not the same as classroom-based, teacher-led, face-to-face learning” (Levy et al. 2015: 5), but rather that “the environment shapes interaction” (Hampel and Stickler 2012: 135) so that online environments can be considered as “sites of practice” rather than “tools for interaction” (Goodfellow and Lea 2007: 29). While synchronous online teaching in audio-graphic conference environments such as Blackboard Collaborate is becoming increasingly common in practice, we are still lacking data to prove normalization, e.g., by linking teachers’ attention focus on technology to different degrees or forms of normalization.

2.1.2 Skills for synchronous online language teaching

To successfully teach synchronous online language lessons, teachers, novice and experienced, need to continuously adapt their existing skills and develop new ones to benefit from the affordances of emerging technologies. They also need to make informed decisions about the activities and environments they will use to facilitate language learning for their students. However, technology still tends to be used to support “old” ways of teaching (Cutrim Schmid and Whyte 2012) rather than leading to the development of new teaching skills (Dougiamas 1998; Wang 2004). In order to move forward from this situation, it is necessary to increase knowledge of the potential of new “sites of practice” and of the ways in which they can promote (language) learning mediated by the skills of online teachers.

The importance of understanding the skills desirable for effective online language teaching has led to the development of a number of frameworks and models used to inform teacher training. These include the pyramid view of synchronous online teaching established by Hampel and Stickler (2005: 317)

which they subsequently described as “grounded in a sociocultural understanding of learning” and which “therefore emphasised the higher skills of facilitating online socialisation, creativity and developing a teaching style that could be ‘owned’ by an individual teacher” (Hampel and Stickler 2015: 64). The seven levels of the skills pyramid are:

- Level 1: Basic ICT competence
 - Level 2: Specific technical competence for the software
 - Level 3: Dealing with constraints and possibilities of the medium
 - Level 4: Online socialisation
 - Level 5: Facilitating communicative competence
 - Level 6: Creativity and choice
 - Level 7: Own style
- (Hampel and Stickler 2005: 317)

Other skills groupings include the Technological Pedagogical and Content Knowledge (TPACK) framework (Koehler and Mishra 2009) which identifies technology, pedagogy and content knowledge as “necessary to successfully integrate technology use into teaching” (p. 60). This model is not specific to language teaching and does not include the higher level skills (levels 4 to 7) of Hampel and Stickler’s pyramid. In 2009, Guichon identified “three main types of competencies pertaining to synchronous online teaching, relating to socio-affective, pedagogical and multimedia regulation”, all of which were claimed to be infused by (rather than separate from) the technical dimensions of online teaching (2009: 170).

For the purposes of this study, the seven levels of Hampel and Stickler’s model provide a wider span of skills than TPACK and greater granularity than Guichon. They link well with the concept of normalization, in that the lower skill levels show little or no normalization whereas the higher ones provide a more likely fit with a normalized use of technology. While there is no shortage of frameworks to describe and analyse online teaching skills, studies exemplifying these skills are still scarce. The actions and reflections of teachers can reveal the skills they employ; and data collected through observation, guided reflection or introspection can then be analysed using the structure of the skills pyramid.

2.2 The experience factor

Both normalization and skills can be measured on sliding scales. We now explain how these can be linked to experience. Researchers have explored the process of progression from face-to-face to online teaching (for example Levy et al. 2009; Wang et al. 2010) and have highlighted the importance of hands-on experience in this transition (Murphy 2015: 47). Highlighting

the importance of reflections, Farrell has suggested that in face-to-face teaching of English as a second language (ESL) experience does not automatically result in the development of expertise “unless teachers consciously and actively reflect on these experiences” (2013: 1080). He identifies five characteristics of teacher expertise: Knowledge of Learners and Learning, Engagement in Critical Reflection, Access to Past Experiences, Informed Lesson Planning and Active Student Involvement (2013: 1071). In an investigation of differences between novice and experienced ESL teachers, Gatbonton called for further “painstaking and careful research” to extend understanding of these differences and enhance teacher training by addressing gaps in beginner teacher skills and knowledge (1999). The present study is an exemplar of that “painstaking and careful research” in the field of online synchronous language teaching.

2.3 Exploring teacher attention and reflection

To draw a fuller picture of how online language teachers teach, and to explore their reasons for their actions, this study combines eyetracking of each teacher’s gaze during online sessions, with their reflections stimulated by viewing playback of their gazeplot superimposed on a video recording of on-screen activity. The method is described in detail in Stickler and Shi (2017). This unique approach has four main advantages: it is (1) robust, (2) flexible, (3) empowering and (4) takes advantage of online data collection opportunities. The following Sections 2.3.1, 2.3.2 and 2.3.4 detail our approach towards these ends.

2.3.1 Eyetracking research

Eyetracking is a research technique that makes use of precise records of eye movement on a screen, and therefore enables detailed study of a person’s attention focus and cognitive process at a given time, as claimed by the “eye-mind” hypothesis (Just and Carpenter 1980). According to Jacob and Karn (2003), the technique was first used in first language (L1) reading research over 100 years ago. It was then adopted extensively in information processing (Rayner 1998, 2009), and in usability research (Nielsen and Pernice 2010). When comparing different research methods in Second Language Acquisition (SLA) to investigate internal processes of language learning, Leow et al. (2014) concluded that “[...] ET [eyetracking] is arguably the most robust measure of learner attention given the rich data it gathers in relation to participants’ eye movements” (p. 117).

2.3.2 Mixed-method eyetracking

Following Nielsen and Pernice's (2010) suggestion that eyetracking should be supplemented with stimulated recall to confirm interpretation in Human-Computer Interaction studies, we adopt a mixed-method approach. This is also in line with more recent uses of eyetracking that combine machine analysis with human input (Fong et al. 2016). In SLA research, Gass and Mackey's (2000) approach to stimulated recall interviews has been widely used. Extending this method, Levy and Kennedy (2004) deployed stimulated reflection to enable learners to describe their language production as well as the language learning process. In the present study, as we will see, complementing eyetracking with teachers' stimulated reflection revived teachers' memories of the online teaching process and the strategies they had used, and at the same time encouraged them to reflect on the differences between online and face-to-face teaching.

Use of stimulated reflective interviews is in line with Schön's concept of a "reflective practitioner" (1987). Reflection has been claimed as an important contributing factor to teachers' initial training and continuing professional development. Although there are some concerns about the relatively vague definition of the concept (e. g., Korthagen 2016), professionals use "reflection on action" (Schön 1987) in educational processes. In the context of online language teachers' professional development, Guichon (2009) too stresses the relevance of reflective analysis. Guided reflection is used in teacher training, and reflection stimulated by recordings of actual classroom teaching can lead to deeper thought processes in teachers (Messmer 2015).

Having noted the professional relevance of reflection, and whilst acknowledging its importance for future applications of our research, in the current context reflection is used not to support the professional development of teachers but as a research tool. Hence, we define reflection as the thoughts teachers revealed while watching back over their own tutorials, stimulated by the gazeplot video of their eyetracking and by participating in a research dialogue.

2.3.3 Advantages of a mixed-method approach

Our method empowers teachers to reflect on and describe their own practices without being constrained by any particular framework or expectations so that they are no longer informants, but co-constructors of knowledge in our study, in line with the sociocultural approach described by Lantolf and Thorne (2007).

We match our data collection methods to the teaching environment, thereby exploiting both the breadth and depth of information available. The recordings of online tutorials and the eye movements of teachers reveal details of online teaching activity and teacher attention. Moreover, as highly self-aware professionals, online language teachers are able to contribute their unique professional insights while being reminded of the moment-by-moment progress of their sessions through stimulated recall or reflective interviews. This takes advantage of the data collection possibilities available in online teaching contexts as recommended by Dede et al. (2009). Finally, from a sociocultural perspective, this approach facilitates the elucidation of additional information, hitherto unavailable without involving teachers as co-constructors of knowledge.

Our combination of methods is flexible enough to allow data triangulation, bringing together qualitative and quantitative data. Capitalising on the strengths described above, our analysis will examine the relative balance of eye focus on content, social, and technical screen areas, and trace the underlying reasons for any observed differences.

2.4 Research questions

In order to establish what online teachers do and what they think while they are teaching online, we investigate their attention focus and their reflections. Attention focus can give us information about their cognitive processes that are otherwise difficult to observe, for example, planning interventions, responding to interactions, or resolving technical problems. Reflection as a research tool can give us an insight into teachers' intentions and strategies, such as establishing social presence or encouraging communication. In this study, we regard teaching strategies as the deliberate and considered application of appropriate skills to promote learning or to resolve a problem; i.e., the conversion of (potential) skills into (concrete) actions. Strategies may bring into action skills at a variety of different levels, such as those presented in Hampel and Stickler's pyramid (Hampel and Stickler 2005; Stickler and Hampel 2015).

We attempt to answer the following questions:

RQ 1: Where do online teachers focus their attention during synchronous, multimodal, interactive tutorials?

RQ 2: What teacher reflections are stimulated by observing eyetracking replay of their teaching?

Online teaching, like every successful educational dialogue (Mercer 2000), relies on establishing rapport between learners and more advanced peers,

including teachers. Our questions are related to the overarching need to establish what happens in online classrooms and to define successful online teaching. In language teaching, dialogue is both means and end with respect to learning. In every pedagogy based on sociocultural theory (Daniels 2007; Vygotsky 1978) dialogue serves as an important vehicle for learning.

2.5 Ethical considerations

The study followed guidelines issued by the British Educational Research Association for ethical research in teaching and learning contexts. In particular, the researchers ensured that the participants felt part of the research process and were fully informed about its purpose and use. Participants were offered a choice of names used in the data and pseudonyms are used for those teachers who requested it. After transcription, interview data were shared with the teachers and they were able to comment again on their reflections.

3 Project description and data analysis

To investigate the process of online synchronous language teaching, three language teachers at the Open University were each invited to conduct an online tutorial in their respective languages of expertise: Valérie in French, Xiaomei in Chinese, and Ella in German. Our sample was opportunistic and purposive insofar as we were looking for tutors at different experience levels and we chose those volunteers easily available to us. Before each tutorial, the researchers interviewed the teacher about her teaching background, teaching beliefs, and views and experience of online teaching. Each tutor then carried out a short online language session with four learners who took part remotely from their own computers in their familiar environment. Although the sessions were shorter than a normal language tutorial at the Open University, by and large they resemble parts of the normal teaching cycle and tutors chose to create tasks equivalent to the standard teaching features.

All three tutorials were held using Blackboard Collaborate software that facilitates synchronous audiographic communication (teachers did not share video of themselves). Teachers taught from computers located in the educational laboratories of the Open University where their eye movements were recorded on a table mounted Tobii 60 eye tracker (62.5 Hz sampling rate). After each tutorial, teachers were asked to watch a replay of their gaze fixations overlaid on a video

recording of the tutorial. The recording comprised the on-screen graphics from the tutor's perspective and a complete sound recording of the session. A researcher sat with each teacher and conducted a stimulated reflection interview with them as they watched and listened. Teachers were able to stop the recording at any time, rewind, and comment on aspects of their teaching or their gaze movement. They were asked to focus on recalling what happened and explaining why it happened. When the stimulated reflection interviews were complete, a short questionnaire was sent to student participants to ensure that no technical or procedural fault (e. g., accidental muting of a microphone) had interfered with the tutorial.

Overall, the data collected for this study consists of:

- Three short pre-process interviews with the teachers
- Three tutorials recorded with eyetracking data (German tutorial 17 minutes, Chinese tutorial 17 minutes, French tutorial 25 minutes)
- Three stimulated reflection interviews based on the gazeplot video and audio replay
- Researcher observation notes
- 12 short (3-item) questionnaires sent to student participants (the results from these did not affect the analysis presented here.)

The pre-process interviews were transcribed (transcription conventions can be found in) and analysed to establish a baseline of previous experience for the teachers in terms of teaching, online teaching and familiarity with the Blackboard Collaborate software. In the overall research process these interviews also served the purpose of easing the participants into the unfamiliar laboratory environment and focussing them on their role as online language teachers before the start of the tutorials.

The eyetracking data were analysed quantitatively using the Tobii software. The fixation duration of the three teachers on different parts of the screen was used to give an indication of attention on specific areas. Areas of Interest (AoIs) were defined (see), dividing the screen into technical, social, and content sections. The logic of this division will become apparent, but for a detailed justification and precise description, see Stickler and Shi (2015).

The stimulated reflection interviews that took place after each teaching session were analysed in two ways. Firstly, recurring types of reflection were identified through content analysis. Two researchers coded and compared notes until a level of agreement was found. Secondly, the most frequent category of codes, Teaching Strategies, was analysed using Hampel and Stickler's skills pyramid (2005) to establish how previous experience related to reflection on

different skill levels. Participant checks with the three teachers were undertaken at every stage of the study and their comments were taken into account.

4 Results and findings

This section presents the findings derived from our mixed-method approach to investigating teacher attention and reflection during synchronous, multimodal, interactive tutorials.

4.1 Teachers' gaze-focus during online tutorials

Our eyetracking data were collected during online tutorials and recorded each teacher's gaze fixations. It showed that the time that teachers spent focussing on different areas of the interface varied with the phase of the tutorial (introduction, teaching, or goodbyes), their level of experience with online teaching and, more specifically, their familiarity with the software interface.

4.1.1 Teacher experience levels

Prior to their online sessions, the three teachers rated themselves and were rated by the researchers on their level of experience in three areas: language teaching, online teaching, and familiarity with the specific software interface used in this study. The first two were rated according to the number of years. For the specific software interface, as it was a fairly new introduction at the Open University, we counted the number of instances of active use. All three participants were very experienced language teachers. However, Valérie had never taught online before taking part in this study. Xiaomei was experienced in both online and face-to-face teaching, but had no familiarity with the new software. Only the German teacher, Ella, had used the online platform before. Table 1 provides an overview of experience levels.

Without any judgement on the teachers' individual skills, their experience level as online language teachers can hence be classified as high (German/Ella), medium high (Chinese/Xiaomei) and low (French/Valérie).

4.1.2 Attention focus on Areas of Interest (Aols)

Eyetracking visualisation showed how the teachers focused on each area of the screen. A heatmap of one screen of the French tutorial (see Figure 1) shows the

Table 1: Tutors' levels of experience.

Tutor	Language	Teaching experience	Online teaching experience	Technical familiarity with software
Ella	German	high	high	high
Xiaomei	Chinese	high	high	none
Valérie	French	high	none	none

different parts of the interface: the audio and video window top left; the participants' window underneath; the textchat box below that. In the central area, there is the whiteboard with teaching content; and in the bottom right corner the computer's clock is displayed.



Figure 1: Heatmap of one slide in Valérie's tutorial.

During an eight-minute section of the French tutorial, Valérie shifted her gaze frequently between the whiteboard, the list of participants, the video window, the textchat, the clock, and the icon for the microphone. Valérie's gazeplot in Figure 2 below shows this.

To add concrete measurements to these impressions and to answer RQ 1, quantitative analysis of the eyetracking data was undertaken by dividing the screen into content, social and technical AoIs, explained below in Table 2.

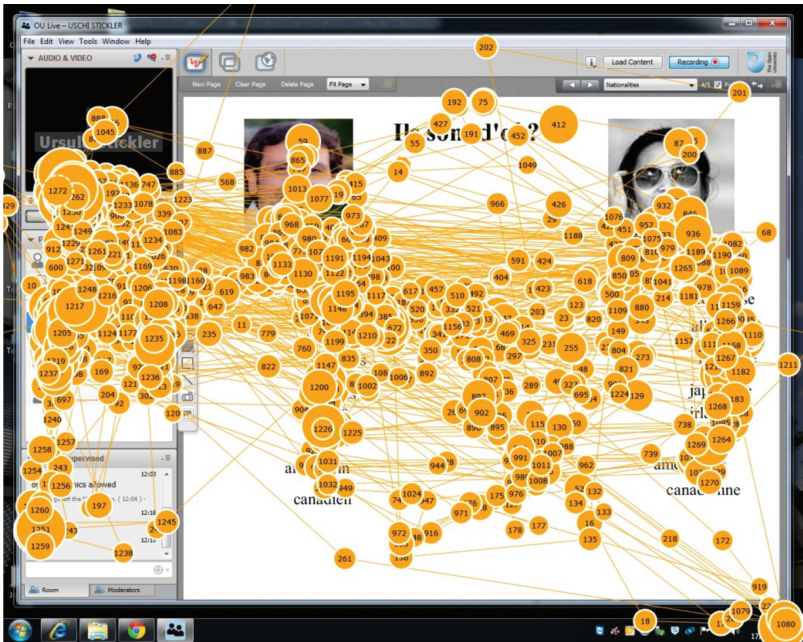


Figure 2: Valérie’s gazeplot (see Stickler and Shi 2017).

Table 2: Definition of Areas of Interest.

Areas of Interest	Explanation	Examples
Content	where the learning material is displayed	whiteboard (interactive, e. g., drag-and-drop)
Social	where participants’ presence is represented	names; icons showing emotion, disagreement; video display window
Technical	where participants activate communication modes	textchat; microphone; video broadcast button

During the teaching phase of the tutorial, the length of fixation on each of the different areas was measured and added up. The results are summarised in Table 3 below.

4.1.3 Attention focus in different phases of sessions

On closer inspection, the pattern is more complex, because online language tutorials, even for short sessions such as those investigated here, have

Table 3: Comparison of attention focus during teaching.

Areas of Interest (Aoi)	Ella	Xiaomei	Valérie
Content	63.4 %	51.0 %	33.4 %
Social	24.7 %	30.6 %	27.9 %
Technical	11.9 %	18.5 %	38.6 %

distinct phases of interaction. The recordings were divided into three phases to reflect this. The phases comprised: an introduction, where the tutor greets and welcomes students, a teaching phase, where content is presented and language taught, and the final phase where participants say goodbye. The beginning and end of tutorials are often overlooked in research, as they are considered only as framing, while the focus stays on the actual teaching phase of sessions. In this research, however, we show that introductions and goodbyes play a distinct role in online teaching, and that eyetracking data reveal unique patterns of fixation shifts for each phase of the tutorial.

4.1.4 Attention focus, experience levels and session phase

In analysing our data, the differences between novice and experienced online tutors became apparent; therefore, it is necessary to investigate this distinction further. Figures 3–5 show the shifting attention focus over the time of the tutorial for Ella (2), Xiaomei (3) and Valérie (4), respectively. Each point shows the amount of time spent on content, social or technical aspects as a percentage of total fixation duration in the “introduction”, “teaching” and “goodbyes” phases of each session.

The shift of fixation across phases (introduction, teaching and goodbyes) mirrors each teacher’s levels of experience with online teaching and with the software in use (see Table 1). Valérie, a novice in both the software in use and online teaching, spent more time focussing on technical AoIs than on social or teaching areas throughout the whole session. Xiaomei, who had taught online with different software focused more on social areas than technical ones, though her focus duration for content exceeded both these areas while she was teaching. Ella, who was experienced with online teaching and the software, spent a lower proportion of her time looking at technical areas than either of the others in all three phases, and displayed a very pronounced emphasis on content while teaching.

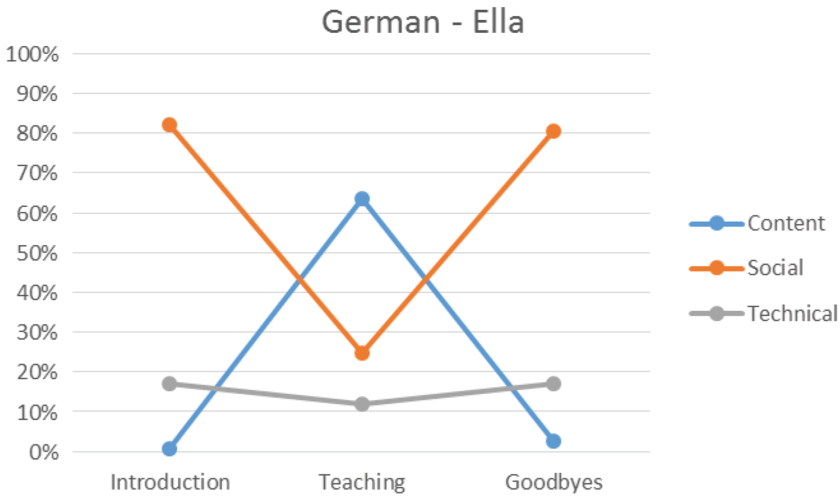


Figure 3: Shifting attention focus of Ella during German tutorial.

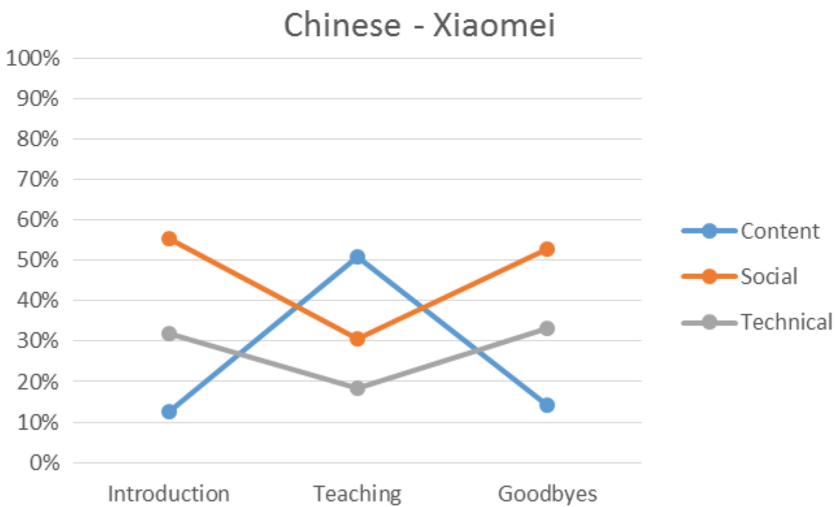


Figure 4: Shifting attention focus of Xiaomei during Chinese tutorial.

The shift of attention from social to content areas and back again follows the flow of the tutorial from introductions to content to goodbyes. The shift between different areas of interest is more pronounced for the two more technically experienced teachers, while for Valérie, her attention to technical areas makes any shift between social areas and teaching content less evident.

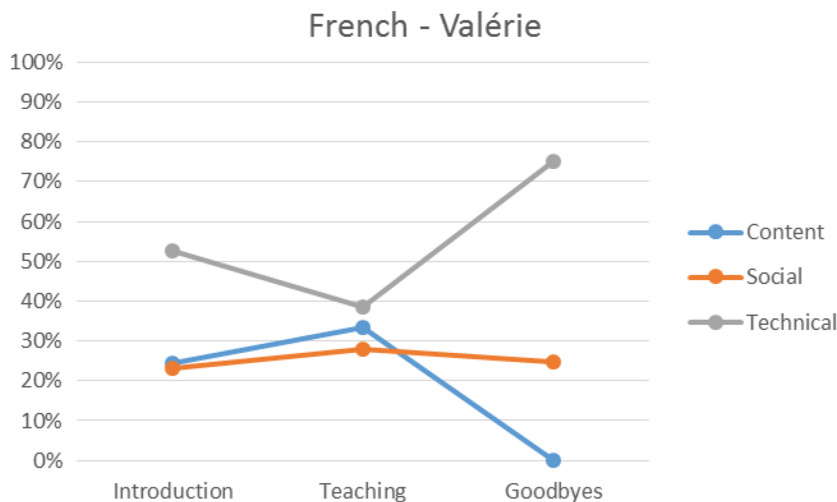


Figure 5: Shifting attention focus of Valérie during French tutorial.

4.1.5 Reasons for differences in attention focus

To find out underlying reasons for any observed difference, the data from the stimulated reflection interviews were also taken into account.

During the teaching phase of her tutorial, Valérie paid comparatively more attention to the technical areas than the other two (38.6% overall) and also a little more to the social areas than Ella (27.9% as compared to 24.7%); see Table 3 above. One of the reasons she gave for focussing on the participants' window (social area) and the microphone button (technical area) was to ensure that the technical limitations of the software did not interfere with her teaching:

But I am also looking at the microphone which, < ... > because I allowed only three multiple speakers, to see how that worked, so I had to keep an eye on the participants' window to make sure not everyone was occupying the three available microphones so that's why you find that, and also I found difficult to try to remember to click on and off my microphone, so there are times when I realise that my microphone isn't on. So I have to repeat what I was saying into the microphone!

(Valérie, stimulated reflection (SR) interview)

Though an experienced online language teacher, Xiaomei spent approximately one-fifth of her attention (18.5%) on the technical area during teaching, mainly the microphone button. This was because she was not familiar with the interface

of Blackboard Collaborate where the position of the microphone button was different from that of the online teaching platform she had used before. There were a few occasions where she forgot to click the microphone button before talking to learners. She described this problem during her SR interview:

I think I probably focus quite a lot on the technical part because this thing is pretty new, the OU Live¹ is new and I am used to using Elluminate, in Elluminate I think every time I need to click 'talk' and 'switch it off' button otherwise the students cannot, so I was busy kind of switching it off and on < ... >

(Xiaomei, SR interview)

Xiaomei here became increasingly aware of the potential problem caused by the microphone button, and tried especially hard to ensure she clicked it when necessary, which led to longer fixation duration, as revealed by the eyetracking data. In her reflections, she stated: "in order to give them [the students] feedback you have to be really good with the technical functions of the software, I think" (Xiaomei, SR interview).

As the most experienced online tutor, who was also highly familiar with Blackboard Collaborate, the German teacher's attention focus mapped out an approximately triangular pattern moving repeatedly from content to technical to social areas. Ella identified and described this during her stimulated recall interview. She said, "it [my gaze] goes sort of in a triangle almost, whiteboard, mic, participants etcetera" (Ella, SR interview).

A closer look at her fixation duration data shows that she spent a considerable part of her attention (24.7%) on social areas, observing and responding to what was going on during the tutorial via different indicators offered by the interface. Her explanation for this is the following:

< ... > each time I find it really important, each time you get a non-verbal sign off a student you have got to, uh, acknowledge it, definitely, if it is a smiley face or you just say "thank you for the smiley" etcetera, you have got to acknowledge you have seen it, the smiley face, uh yeah the non-verbal sign, that's why you can see. < ... > Okay that's what I am doing

(Ella, SR interview)

These short extracts from the interviews show not only that the teachers are aware of their need to focus on different areas of the screen and can explain the reasons behind them, but also how the eyetracking visualisation can support reflection.

1 The teachers in our study sometimes called Blackboard Collaborate "OU Live", in reference to a customised version of the software adapted to the needs of the Open University.

4.2 Teachers' reflections stimulated through eyetracking replay

After their online tutorials, teachers took part in stimulated reflection interviews with the eyetracking recordings and interviewer questions² as stimulus, producing detailed and deep reflections. To answer RQ 2 (*What teacher reflections are stimulated by observing eyetracking replay of their teaching?*) researchers coded transcripts of teacher reflections, following a grounded approach. We found different types of reflections and explanations, the majority of which were devoted to teaching strategies. These latter were further subjected to thematic analysis, with categories based on the pre-defined levels of the online teaching skills pyramid (Hampel and Stickler 2005).

4.2.1 Types of teacher reflections

Using a grounded approach (“bottom-up” analysis), teachers' reflections were grouped into different categories. The codes and categories developed organically during the process of analysis carried out by two of the three authors. The following are examples of the types of reflections identified, followed by definitions and explanations.

Explaining the Eye Focus (EF)

During the stimulated reflection interview, participants developed the habit of explaining to the researcher or interviewer where their eyes were focusing and why. For example, Ella explained: “you can see my eyes are all over the place, you can see I am just checking here, over there, yeah. I am just checking, is everything there.” This type of explanation was coded as *Explaining the Eye Focus* (EF) and defined as: “an attempt to explain the video recording and gazeplot, helping the researcher and /or helping themselves understand what they were doing.” Typical verbal expressions during the EF are phrases like “you see”, “look”, “can you see”, and the word “explain” was used explicitly.

Reflections on the Research Process (RP)

Reflections on the Research Process (RP) were less frequent; here is a typical example:

² Typical questions are “Right, so here at the beginning what were you doing here?”

Uuhhm, I don't know I think it's, because it's not a normal situation, I think, and we had only what, 10, 15 minutes and, uh, I was conscious that the next screen was interactive so < ... > I – and for you! I thought – whereas, otherwise in a normal teaching situation I might have opened a blank screen and written down “*j’habite à Milton Keynes, en Angleterre, j’habite à Pau, en France*” – and given them an extra 10 minutes to do that, you know, but with this situation I <hhh>, I just stuck to my guns, so that's why I'm not sure whether or not I would have done that in a real situation [...]

(Valérie, SR interview)

This consciously taking the research situation into account is defined as “the teacher thinking about how the research is impacting on teaching or how the eyetracking can enhance reflection.” Typical expressions used are “my eyes”, “in a normal situation”.

Reflections on Online Teaching (OT)

Reflections on Online Teaching (OT) were quite frequent during these stimulated reflection interviews, not surprisingly, as the participants were well aware of our research questions. A typical reflection is Xiaomei's focus on the complexity of online teaching:

That's kind of the reality of online teaching and there is a lot of things to do, you know, you have to have half of the brain is on the content, you make sure students understand, make sure students understand what to do, how well they did. But the other half of your brain it seems you have to give them feedback ...

(Xiaomei, SR interview)

Characteristic of this type of reflection is the explicit focus on the medium; OT is defined as “talking about what makes online teaching different, how the technical side of online teaching impacts on teacher behaviour”. Typical expressions include “on the screen”, “I always”, “online”.

A subcategory of OT, *Reflection on Online Teaching Interface* (OTi), appears once for each of the teachers, and shows an explicit focus on the online interface (“I think it would be better actually the button made into red, so if it is red you definitely know that it is something on”; Xiaomei, SR interview). Going beyond just explaining what they are doing online or reflecting on the skills used, the teachers start thinking about the suitability of the interface and making technical suggestions for improvement or changes that would make online teaching more convenient.

Teaching Strategies for online teaching (TS)

During coding, it became apparent that the majority of reflections were devoted to strategies for online teaching. The teachers reflected on how they used the interface to interact with their learners and how they projected their teaching

persona through the online medium. As this category is dealt with separately in Section 4.2.2, and analysed in detail according to the different levels of the online teaching skills pyramid (Hampel and Stickler 2005, 2015), here we present just one short example from Ella's reflections:

I need to see whether the students are understanding, what students click on, the smiley etcetera, so I usually have always the students in vision, that's really, really important to me ...

Minus Teaching Strategies (TS-)

Where the focus is on something missing from the online environment or a lack of fit between existing teaching skills and the interface provided, the coding is recorded as TS- (TS minus). This does not indicate a lack of teaching skills; on the contrary, this code occurred when highly skilled face-to-face teachers wanted to use their skills in the online environment but could not. Here is a typical example from Valérie's stimulated reflection interview:

I would have probably in a face-to-face situation I would have stopped on that, probably introduced "*en France, en Ingleterre, en Autriche*" – but really as a kind of, just picking up on their own countries, nothing more, and built it in.

(Valérie, SR interview)

The use of conditionals, "would" or "could", typically alerted researchers to this type of reflection. TS- was defined as: "a reflection on the constraints of online teaching, a speculative or potential teaching strategy, reflection on something that could have happened /would have been employed in a 'normal' or face-to-face situation. Focus on personal or technical constraints or lack of experience."

Reflection on Teaching (T)

The final category, *Reflection on Teaching* (T), shows how the stimulated reflection and participation in the eyetracking experiment helped teachers to become more aware of their teaching, and gave them a stage to voice their pedagogical beliefs. T and its sub-category *Teaching Beliefs* (Tb) were coded where the focus was not on online teaching specifically, and the reflection went beyond the specific skill needed in the immediate context. A typical example from Xiaomei reads like this:

I kind of have a hypothesis, you know, that the teacher may still carry the same teaching style, for example, if a teacher like me uses a lot of gestures, facial expressions, umm, even I am teaching online my students are not face me, my students are far, far away I still do a lot of facial changes, moving of my hands, smiles, you know, maybe I am kind of trying to

imagine my students just there, just there, so yes I think maybe, you know, the teaching online does not change your teaching style, you know, which you developed from teaching classroom or your communication skills or your personality I think.

(Xiaomei, SR interview)

Defined as “reflection on general teaching pedagogy, teaching intentions, language teaching”, these reflections are often introduced by statements like “this is what I am doing”, evaluations like “a good session”, or specific evaluations on the students’ learning, such as “she is learning”, “he is speaking”. The subcategory *Teaching beliefs* (Tb) often included meta-language like “communicative”, “teaching style”, or “personality”.

After the open coding of the teachers’ reflections, the frequencies and percentages were tabulated (see Table 4). Ella mainly reflected on teaching strategies (TS) (51.9%), explaining her own eye-movement (EF) (19.5 %), and online teaching (OT) including her thoughts on the interface (OTi) (10.4 %). Xiaomei’s reflections were mainly about teaching strategies (TS) (58.1%), eye movement (EF) (14.5 %), and strategies she could have used that were constrained by the environment (TS-) (12.9%). Valérie’s reflections were

Table 4: Number and percentage of reflections in each category.

Reflections	Ella	Xiaomei	Valérie	Total
Explaining the Eye Focus (EF)	15 (19.5 %)	9 (14.5 %)	7 (9.0 %)	31
Reflection on the Research Process (RP)	4 (5.2 %)	1 (1.6 %)	3 (3.8 %)	8
Reflection on Online Teaching (OT)	7 (9.1 %)	3 (4.8 %)	15 (19.2 %)	25
Reflection on Online Teaching, specifically the interface (OTi)	1 (1.3 %)	1 (1.6 %)	1 (1.3 %)	3
Teaching Strategies for online teaching (TS)	40 (51.9 %)	36 (58.1 %)	28 (35.9 %)	104
-Teaching Strategies (TS-)	2 (2.6 %)	8 (12.9 %)	22 (28.2 %)	32
Reflection on Teaching (T)	6 (7.8 %)	3 (4.8 %)	1 (1.3 %)	10
Reflection on Teaching, specifically teaching beliefs (Tb)	1 (1.3 %)	1 (1.6 %)	1 (1.3 %)	3
Unclassified	1 (1.3 %)	0	0	1
Total	77	62	78	217

dominated by thoughts on teaching strategies she had used (TS) (35.9 %) and those she could not realise online (TS-) (28.2%), as well as online teaching (OT) (19.2%).

Interpreting reflections on teaching strategies, teaching and teaching beliefs (TS, T, Tb) as positive ideas, and grouping those reflections that emphasise differences between face-to-face teaching and online teaching (OT, OTi, TS-) as negative, highlights teacher attitude to the online environment. The emphasis placed by the technically less experienced teachers on the constraints of the online learning environment can be seen clearly in Figure 6.

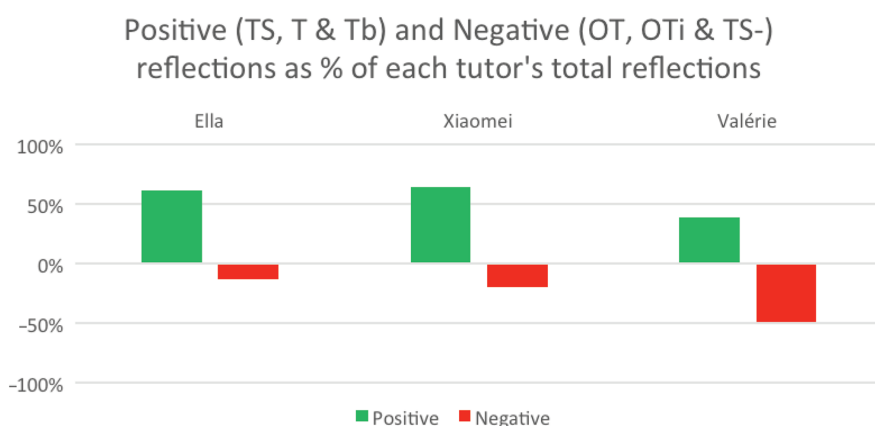


Figure 6: Positive and negative reflections.

4.2.2 Teaching strategies

From Tables 4 and 6, one can see that nearly half of all tutor reflections were focussed on Teaching Strategies (TS) (104 out 217 in total) and that this was therefore the most prominent theme of reflections. Skills relating to these teaching strategies were categorised using the pyramid of online teaching skills first developed by Hampel and Stickler (2005). Choosing this more detailed categorisation, rather than the more recent version of the pyramid of skills (Stickler and Hampel 2015) that merges levels, allowed a more fine-grained analysis, particularly distinguishing between reflections on the two highest levels (creativity and choice vs. own style) and including the category “basic technical skills” important to this study.

To illustrate the difference between basic ICT competence (Level 1) and software specific skills (Level 2), here are two examples from Valérie's recall interview:

Level 1

checking the clock again. Uhm < ... >, just going round things to see if anyone is interacting or anyone doing anything anywhere, the clock again!

(Valérie, SR interview)

Level 2

Just checking the microphone all the time to make sure I'm clicked on [...]

(Valérie, SR interview)

Whereas the first reflection refers to basic skills, like taking in all the different areas of the screen, much as a face-to-face teacher would ensure she had all areas of the classroom visible to her, the second reflection specifically mentions the necessity to have the microphone button in the "on" or "talk" position so that students can hear the teacher when she is speaking. Not all video conferencing tools have this particular setting, and the reflection shows that the teacher paid attention to her specific environment.

On the two highest levels of online teaching skills, the teachers provide some impressive examples of making the most of the online environment, showing that they are clearly aware of the choices they make when selecting teaching strategies and teaching materials (Level 6), and ensuring that their own style is transparent in their teaching (Level 7). There follow two examples from Xiaomei, and two from Ella's reflections:

Level 6

yeah, yeah, yeah but I thought maybe some students will uh, because when I planned this session I thought "oh maybe someone will finish early or find it too easy" so I put 2 extra slides in there, then *Ma Li* actually just made that mistake so I can actually show everybody

(Xiaomei, SR interview)

Level 7

The only thing is, yeah because when I teach, even though it is online, and now I am teaching with the camera I teach with hands and feet, honestly

(Ella, SR interview)

This extract shows a second example where Xiaomei describes a level 7 skill. Her comments are presented alongside the extract from the tutorial recording that stimulated them.

Extract from Chinese tutorial recording:	Xiaomei's reflections on the recording:
T: <瘦Shòu >, people saying do you have some kind of illness or disease, okay? And then you look at <胖Pàng >, it is a moon and a half here, so you have to imagine someone's tummy is like a shape of half moon	now I even move my arm trying to imagine! (laughter). You can't see it here but actually I am moving my arms, you know kind of imitating that image because I think it would be nice, I can draw something here so that people can see what I am talking about but to compensate I do it myself! And no one can see it! (laughter)

A level 7 example from Ella's comments is given below:

Extract from German tutorial recording:	Ella's reflections on the recording:
T: <Vielen Dank. Und Tschüs, bis zum nächsten Mal, Tschüs.>	[...] seeing if there are any comments, questions maybe, and also waiting, obviously I always make sure I am the last to leave the tutorial room, definitely, just for any, yeah any signs that there might be a question

The overall results for different skill levels for all three teachers are shown in Figure 7.

Comparing the reflections of the three teachers analysed according to the different levels of the online teaching skills pyramid shows that more time is spent reflecting on lower levels of the pyramid by the less technically experienced tutors; the higher the skill and confidence with technology and software, the more reflections were made on style and personalising teaching.

5 Discussion

Bringing together our findings with existing literature, we now start drawing inferences from the data revealing teachers' attention during synchronous online language tutorials and their reflection.

5.1 Teacher attention

The eyetracking data showed that the online language teachers constantly shifted their attention around different areas of the screen. They focussed not

Skill levels revealed in reflections on Teaching Strategies

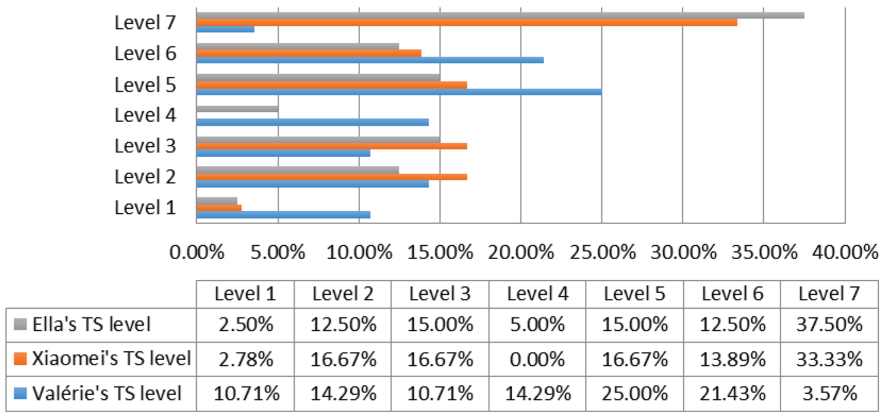


Figure 7: Skill levels revealed in reflections on teaching strategies.

only on content-related areas, but also on technical tools and on-screen functions facilitating online socialisation. This evidence of the need to maintain awareness of different aspects of the learning space confirms that online language teaching is a challenging task (Wang et al. 2010), requiring a set of particular skills (e. g. Guichon 2009; Levy et al. 2009).

The most experienced online tutor in this study was Ella, the German teacher. Her attention focus on the screen followed a triangular pattern, moving between content, technical and social areas regularly and repeatedly. This finding is in line with what Levy et al. (2009) observed in their study: that online teachers needed to regularly “scan” different parts of the screen. Moreover, in our study, Ella who was highly aware of this pattern, consciously carried out this behaviour as part of her strategic approach to online teaching. This shows that, as a competent online teacher, she is fully aware of the strategies she uses.

In this study, we revealed that variations of eye focus on different parts of the screen are related to teachers’ experience of online teaching in general or of using a particular e-platform. The teacher least familiar with online teaching tools had to spend more time on technology-related features of the screen (e. g. buttons, icons), while teachers with more online teaching experience could focus more on the teaching content, as well as on establishing social contacts

with students. This is likely to make online teaching more engaging. Our findings helped to prove the veracity of Levy and his colleagues' claim that online tutors need "extensive exposure and practice in online pedagogical strategies and techniques in order to become fluent and confident in this environment" (Levy et al. 2009: 33).

The proportion of teachers' attention on social areas during their online tutorials ranged from 24.7% to 30.6%, which is slightly higher than the proportion of students' attention on the same areas (20.52%) discovered in Stickler and Shi's previous study (2015). These high proportions emphasise the importance of social aspects of online teaching for both teachers and students. Teachers, however, are clearly aware of the limitations of online teaching and try to compensate for the loss of non-verbal cues (Hampel and Stickler 2012).

Our data further revealed that the more technically experienced online teachers used the opening and closing period of the tutorial as a time to engage students socially (e. g., welcoming students verbally or sending emoticons at the end of the online session). By contrast, the teacher who was unfamiliar with online teaching had to spend more time and attention on technical aspects; this is in line with findings by Sun (2011) who focuses in her study on the communication breakdown caused by technical problems in online language classes. By applying our novel segmentation of online tutorials into Introduction, Teaching and Goodbyes, we have shown the importance of framing elements to the actual teaching events. We hope this will encourage researchers to pay more attention to the wider social context of online teaching. It also helps to confirm our teachers' intuitive understanding of proper framing to create a friendly online learning environment.

5.2 Teacher reflection

Reflective practice (Schön 1987) has been a key concept in many teacher training programmes, including ones for online language teachers (e. g. Guichon 2009; Wang et al. 2010). In this study, reflections stimulated by teachers watching the re-play of their eye movement provided rich insights into their thoughts and strategies during online teaching.

The three teachers in the study reflected on a wide range of topics: on their teaching strategies; on the impact of the research process on their teaching; on their teaching and teaching beliefs; and on the constraints and opportunities of the online environment. This echoes Guichon's suggestion that encouraging reflection could help teachers to develop meta-cognitive strategies and to

“regulate their own activity and act efficiently in the identification and the resolution of professional [dilemmas]” (Guichon 2009: 181).

Moreover, the form of reflection differs with teachers’ levels of online experience: the novice online teacher focuses more on the deficit and difficulties of online teaching, constantly comparing it to the possibilities of face-to-face classes (28.2% of Valérie’s reflections are dedicated to deficiencies or TS-). Reflection on teaching online (OT), i. e., on the specific medium rather than the pedagogy or didactics, also played a large role in her reflection interview. The two more experienced online teachers, however, dedicated more of their reflections to Teaching Strategies (TS) and to reflections on teaching (T) in general.

This can be seen as an indication of the process of “normalization” (Bax 2003): when technology is still relatively novel, the teacher is busy thinking about options available to her, constantly searching for substitutions for her highly skilled and strategized face-to-face teaching procedures. When technology becomes more familiar, it fades into the background of reflections, only brought to the fore where – as in the case of Xiaomei – a sudden shift in organisation of the interface interferes with the normal process.

Once the technology is normalized, as in the case of Ella, reflection shifts to teaching strategies, pedagogy, and even to helping the researcher understand the eye focus (20%) and reflect on the process of researching (5%). Only 3% (2 statements) of Ella’s reflections are concerned with deficits in the online environment, with things she cannot do in the same way as in a face-to-face class. The variation displaying different skill levels of these teachers is in line with Hampel and Stickler’s research (2005, 2015).

In the current study, teachers’ reflections largely focussed on the teaching strategies they applied during their online tutorials. Around 10% of teaching strategies that Valérie recalled were related to ICT skills (Level 1), while for more experienced teachers, the percentage was under 3%. More than a third of experienced teachers’ comments on teaching strategies related to the highest level of online teaching skill – “own style”. It would seem natural that, if a teacher is struggling with the basic technical functions of an online platform, the time and space left for them to be creative is reduced. Our findings confirmed the ongoing importance of ICT skills (especially familiarity with a particular teaching platform) for an online teacher despite the fact that the use of technology is now seen as a norm. This finding contradicts Stickler and Hampel (2015) who removed basic ICT skills from the skills pyramid as a factor because they are already taken for granted. In Guichon’s study (2009), he holds that ICT skills are “infused” in the different skills required for online teaching. Our study shows that technical skills

remain prominent and deserving of attention in their own right in online language teaching.

In relating the teaching strategies discussed by the three teachers with the skills pyramid (Hampel and Stickler 2005) we have managed to show how experience is a relevant factor in determining the skill levels deployed in online teaching. Although the development of online teaching skills is by no means linear, it is “difficult for a teacher to show creative use of a medium for language learning and teaching that s/he is not very familiar with” (Stickler and Hampel 2015: 65).

5.3 Mixed-method inferences

Positioning our research in a sociocultural framework (Lantolf 2000; Lantolf and Thorne 2007; Vygotsky 1978), it is important to enrich eyetracking as a data collection method with introspective methods allowing insights into teachers’ experiences. The reflection data also confirmed and triangulated eyetracking data. For example, the eyetracking data showed that, during the teaching phase of her tutorial, 11.9 % of Ella’s attention was on technical areas of the screen. Her reflections on TS- and OT were roughly the same total amount (2.6 % plus 9.1 %). Overall, the combination of research methods generated rich data and in-depth findings, and increased the validity of this study.

Through a sociocultural perspective, the learning opportunities for participants in this study should also not be overlooked. From the teachers’ reflective interviews, one can see that all the participants were already highly reflective and expressed an awareness of the teaching strategies they used. In prompting reflection on their teaching practices, this research may have helped them to develop even further as online teachers (see, e. g., Guichon 2009; Hampel and Stickler 2015; Wang et al. 2010). This is an avenue to explore further in future studies: how we can utilise eyetracking as a method for enhanced teacher reflection and to support teachers’ continuing professional development.

For educators following a behaviourist tradition, the quantitative analysis of eyetracking in our study will be informative, whereas teacher trainers working in the reflective tradition (Schön 1987) will be able to appreciate the findings gathered from our reflective interviews. Rooted in sociocultural theory, we claim a position that spans from the material base of learning exemplified in quantitative eyetracking data to the world of ideas represented in practitioners’ reflections on strategic decisions. Our data are taken from language teaching contexts, but transferable to all educational settings where dialogue is the centre of knowledge building (Mercer 2000): successful educational dialogues rely on

establishing rapport between learners and more advanced peers (Daniels 2007; Vygotsky 1978). Building rapport is one of the teaching skills we investigated. Another is the use of different interaction patterns for different phases of the tutorial – introductions, content-focussed phases and farewells are all relevant to creating an atmosphere conducive to learning. Skills supporting successful communication as exemplified by our language teachers can thus be transferred to any other teaching subject.

6 Conclusion

Our research set out to discover what was going on in the minds of online language tutors during synchronous online tutorials. We have interpreted our data using the frameworks of normalization (Bax 2003) and online teaching skills (Hampel and Stickler 2005). As stated previously and confirmed by our research, online language teachers are highly skilled and highly self-aware.

6.1 Implications of our study

Based on our findings, we can draw the following conclusions about online teaching processes:

- Our unique combination of methods (see Section 3 and Stickler and Shi 2017) has allowed us to collect rich data about teachers' attention focus and reflections, thus opening a window onto their minds as they are engaged with online language teaching.
- By segmenting online teaching sessions in three parts (Introduction, Teaching, Goodbyes), we bring to the fore the importance of framing teaching events in a social learning context recognising learners' affective and pedagogical needs.
- The use of stimulated reflection, i. e. interviews based around a replay of eyetracking data, can triangulate and confirm findings from pure eyetracking. In our case the interview data show that more experienced tutors spend more time on attending to social and content areas (see Table 3) and reflect more frequently about online teaching skills at a higher level of the online teaching skills pyramid (see Figure 7).
- Different degrees of normalization of online language teaching are achieved through practitioners' experience with the specific tool used as discussed in Sections 4.1.4 and 5.2. However, there is no link between the general level of

expertise (i. e. theoretical knowledge of the field) and normalization (see Table 1).

- “Normalized” online teaching seems to free cognitive faculties for dealing with other factors of language teaching, for example, social factors or questions of teachers’ individual style (see Figure 7).
- Figure 6 shows that the reflections of the less experienced online language teacher are centred around things that cannot be done in the online classroom (“negativity”) and on differences between online and face-to-face teaching (“difference”).

The study as a whole provides evidence that although expertise in language teaching and knowledge of the specific technical environments are desirable (and probably necessary) conditions for becoming an online language teacher, they are not sufficient: online teaching experience is essential and therefore should be part of every teacher training programme (see also Levy et al. 2009).

6.2 Limitations and future research

We are aware of certain limitations of our study. Although eyetracking generates substantial data even from just one short experiment, for a quantitative study the number of participants would be too small. Another limitation is our implicit reliance on the eye-mind hypothesis: this fundamental claim that eyetracking tells us anything valuable about users’ attention focus has been questioned (Posner 1980, 2014). Casting doubt on the eye-mind-hypothesis could thus undermine the validity of our quantitative data. However, the findings based on teachers’ reflections are independent of it and the teachers’ explanations of gazeplots suggest that eyetracking does give indications of attention focus that coincide with teachers’ perceptions of their own actions.

Reflection on teaching, although it is highly valued as part of teacher development and practitioner research (e. g., Schön 1987), is also not without its detractors (Korthagen 2016) and may not be fully appreciated as a research method. In our methodology we rely on the self-awareness, reflectiveness and honesty of our participants. Without their frank and open contributions, we could not claim any insight into the workings of teachers’ minds.

Lastly, our research is based on tutorials that are not part of the standard teaching process. Student volunteers were invited, and the tutorial was offered as additional, voluntary speaking practice. Therefore the cohesion and familiarity present in many online learning groups was not part of this set-up.

To confirm our findings, future studies should allow for more variation in teachers' experience levels. On the basis of our study, we would argue that predominantly reflecting on negativity and difference might be a necessary stage in the development of a skilful online language teacher but this would merit further research. For future investigations of online teaching it would also be desirable to take a more authentic approach to tutorials and online learning groups, and to combine understanding of a teacher's perspective with simultaneous learner reflections.

Our innovative combination of research methods has enabled us to contribute to the understanding of online teaching processes. We hope that our conclusions will influence future online teaching practices and related training for languages, and also for other subjects. Because of the growing demand for online teaching that achieves the highest possible skill level, our findings have the potential to change the way we teach, train and research, to the benefit to the ever-growing community of online teachers and teacher trainers.

References

- Bax, S. 2003. CALL – past, present and future. *System* 31(1). 13–28. doi:10.1016/s0346-251x(02)00071-4
- Cutrim Schmid, E. & S. Whyte. 2012. Interactive whiteboards in state school settings: Teacher responses to socio-constructivist hegemonies. *Language Learning & Technology* 16(2). 65–86.
- Daniels, H. 2007. Pedagogy. In H. Daniels, M. Cole & J. Wertsch (eds.), *Cambridge companion to Vygotsky*, 307–332. New York: Cambridge University Press.
- Dede, C., D. J. Ketelhut, P. Whitehouse, L. Breit & E. McCloskey. 2009. A research agenda for online teacher professional development. *Journal of teacher education* 60(1). 8–19.
- Dougiamas, M. 1998. A journey into Constructivism <https://dougiamas.com/archives/a-journey-into-constructivism/> (accessed 6 March 2017).
- Farrell, T. S. C. 2013. Reflecting on ESL teacher expertise: A case study. *System* 41. 1070–1082.
- Fong, A., D. Hoffman & R. M. Ratwani. 2016. Making sense of mobile eye-tracking data in the real-world: A human-in-the-loop analysis approach. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* 60(1). 1569–1573. doi:10.1177/1541931213601362
- Gass, S. M. & A. Mackey. 2000. *Stimulated recall methodology in second language research*. London: Routledge.
- Gatbonton, E. 1999. Investigating novice and experienced esl teacher differences: Implications for teacher training. *Japan Association for Language Teaching (JALT) Journal* 23(6). <http://jalt-publications.org/tlt/articles/2539-investigating-novice-and-experienced-esl-teacher-differences-implications-teacher-> (accessed 6 March 2017).
- Goodfellow, R. & M. R. Lea. 2007. *Challenging E-learning in the University*. Maidenhead: SRHE/Open University Press.
- Guichon, N. 2009. Training future language teachers to develop online tutor's competence through reflective analysis. *ReCALL* 21(2). 166–185.

- Hampel, R. 2009. Training teachers for the multimedia age: Developing teacher expertise to enhance online learner interaction and collaboration. *International Journal of Innovation in Language Learning and Teaching* 3(1). 35–50.
- Hampel, R. & B. de los Arcos. 2013. Interacting at a distance: A critical review of the role of ICT in developing the learner-context interface in a university language programme. *Innovation in Language Learning and Teaching* 7(2). 158–178.
- Hampel, R. & U. Stickler. 2005. New skills for new classrooms: Training tutors to teach languages online. *Computer Assisted Language Learning* 18(4). 311–326.
- Hampel, R. & U. Stickler. 2012. The use of videoconferencing to support multimodal interaction in an online language classroom. *ReCALL* 24(2). 116–137.
- Hampel, R. & U. Stickler. 2015. Introduction: From teacher training to self-reflective practice. In R. Hampel & U. Stickler (eds.), *Developing online language teaching: Research-based pedagogies and reflective practices*, 1–11. Basingstoke: Palgrave Macmillan.
- Jacob, R. J. & K. S. Karn. 2003. Eye tracking in human-computer interaction and usability research: Ready to deliver the promises. In R. Radach, J. Hyona & H. Deubel (eds.), *The mind's eye: Cognitive and applied aspects of eye movement research*, 573–605. Amsterdam: Elsevier Science.
- Just, M. A. & P. A. Carpenter. 1980. A theory of reading: From eye fixations to comprehension. *Psychological Review* 87. 329–354.
- Koehler, M. J. & P. Mishra. 2009. What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education* 9(1). 60–70.
- Korthagen, F. 2016. Inconvenient truths about teacher learning: Towards professional development 3.0. *Teachers and Teaching* 23(4). 1–19.
- Lantolf, J. P. 2000. Introducing sociocultural theory. In J. P. Lantolf (ed.), *Sociocultural theory and second language learning*, 1–26. Oxford: Oxford University Press.
- Lantolf, J. P. & S. L. Thorne. 2007. Sociocultural theory and second language learning. In B. VanPatten & J. Williams (eds.), *Theories in second language acquisition*, 201–224. Mahwah, NJ: Lawrence Erlbaum.
- Leow, R. P., S. Grey, S. Marijuan & C. Moorman. 2014. Concurrent data elicitation procedures, processes, and the early stages of L2 learning: A critical overview. *Second Language Research* 30(2). 111–127.
- Levy, M., P. Hubbard, G. Stockwell & J. Colpaert. 2015. Research challenges in CALL. *Computer Assisted Language Learning* 28(1). 1–6.
- Levy, M. & C. Kennedy. 2004. A task-cycling pedagogy using stimulated reflection and audioconferencing in foreign language learning. *Language Learning & Technology* 8(2). 50–68.
- Levy, M., Y. Wang & N.-S. Chen. 2009. Developing the skills and techniques for online language teaching: A focus on the process. *Innovation in Language Learning and Teaching* 3(1). 17–34.
- Mercer, N. 2000. *Words and minds: How we use language to think together*. London: Routledge.
- Messmer, R. 2015. Stimulated Recall als fokussierter Zugang zu Handlungs- und Denkprozessen von Lehrpersonen. *Forum Qualitative Social Research* 16(1). <http://nbn-resolving.de/urn:nbn:de:0114-fqs150130> (accessed 6 March 2017).
- Murphy, L. 2011. Autonomy and context: A tale of two learners. In D. Gardner (ed.), *Fostering autonomy in language learners*, 17–26. Gaziantep: Zirve University.
- Murphy, L. 2015. Online language teaching: The learner's perspective. In R. Hampel & U. Stickler (eds.), *Developing online language teaching: Research-based pedagogies and reflective practices*, 45–62. Basingstoke: Palgrave Macmillan.

- Nielsen, J. & K. Pernice. 2010. *Eyetracking web usability*. Berkeley: New Riders.
- O'Rourke, B., L. Shi, B. Smith, U. Stickler & C. Prendergast. 2015. Eyetracking in CALL – present and future. In A. M. Gimeno Sanz, M. Levy, F. Blin & D. Barr (eds.), *WorldCALL: Sustainability and computer-assisted language learning*, 285–298. London & New York: Bloomsbury.
- Posner, M. I. 1980. Orienting of attention. *Quarterly Journal of Experimental Psychology* 32(1). 3–25.
- Posner, M. I. 2014. Orienting of attention: Then and now. *Quarterly Journal of Experimental Psychology* DOI: 10.1080/17470218.2014.937446 (accessed 3 March 2017).
- Rayner, K. 1998. Eye movements in reading and information processing: 20 years of research. *Psychological Bulletin* 124(3). 372–422.
- Rayner, K. 2009. Eye movements and attention in reading, scene perception, and visual search. *Quarterly Journal of Experimental Psychology* 62(8). 1457–1506.
- Schön, D. A. 1987. *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*. San Francisco: Jossey-Bass.
- Stickler, U. & R. Hampel 2015. Transforming teaching: New skills for online language learning spaces. In R. Hampel & U. Stickler (eds.), *Developing online language teaching: Research-based pedagogies and reflective practices*, 63–77. Basingstoke: Palgrave Macmillan.
- Stickler, U. & L. Shi 2015. Eye movements of online Chinese learners. *CALICO* 32(1). 52–81.
- Stickler, U. & L. Shi. 2017. Eyetracking methodology in SCMC: A tool for empowering learning and teaching. *ReCALL*. 1–18. doi:10.1017/S0958344017000040.
- Stickler, U., B. Smith & L. Shi. 2016. Using eye-tracking technology to explore online learner interactions. In C. Caws & M.-J. Hamel (eds.), *Language-learner computer interactions: Theory, methodology and CALL applications*, 163–186. Amsterdam: John Benjamins.
- Sun, S. Y. H. 2011. Online language teaching: The pedagogical challenges. *Knowledge Management & E-Learning: An International Journal (KM&EL)* 3(3). 428–447.
- Vygotsky, L. S. 1978. *Mind in Society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wang, Y. 2004. Distance language learning: Interactive Fourth-generation internet-based videoconferencing. *CALICO* 21(2). 373–395.
- Wang, Y., N.-S. Chen & M. Levy. 2010. Teacher training in a synchronous cyber face-to-face classroom: Characterizing and supporting the online teachers' learning process. *Computer Assisted Language Learning* 23(4). 277–293.
- Wertsch, J. V. 1994. The primacy of mediated action in sociocultural studies. *Mind, Culture, and Activity* 1(4). 202–208.

Appendix A. Transcription conventions

- ./ = self-interruption
 < ... > indicates longer pause
 ? = intonation up at the end <rough indication only>
 <??> = incomprehensible
 <hhh> = audible sigh

Bionotes

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Ursula Stickler is Senior Lecturer in German in the School of Languages and Applied Linguistics at the Open University, UK. Her research focuses on independent and technology enhanced language learning and teacher training. She has published widely in the areas of Tandem learning, teacher training for online teaching, qualitative and mixed methods for Computer Assisted Language Learning (CALL) research, and eyetracking. She is co-editor of *System*, the International Journal of Educational Technology and Applied Linguistics. She is also a Senior Fellow of the Higher Education Academy, UK.

Mair E. Lloyd

Mair E. Lloyd has recently been awarded her doctorate for research that explores a communicative approach to Latin teaching through a sociocultural perspective on language learning. She received the Open University Vice-Chancellor Sir John Daniel Award for Education and Language Studies in recognition of her dedication and achievement as a PhD candidate. Mair intends to pursue further research in language pedagogy with particular emphasis on learning through interaction, technology for ancient language learning and the use of intersemiotic translations and eyetracking in exploring reading skills.